SAF-RC-008
ERDF Groundwater Well Samples
FINAL VALIDATION PACKAGE

COMPLETE COPY OF VALIDATION PACKAGE TO:

Kathy Wendt H4-21

COMMENTS:

SDG K3986 SAF-RC-008

ERDF GROUNDWATER WELL SAMPLES – Sept. 2012

Date: 21 November 2012
To: Washington Closure Hanford (technical representative)
From: ELR Consulting
Project: ERDF Groundwater Well Samples – September 2012
Subject: Wet Chemistry - Data Package No. K3986-LLI

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. K3986 prepared by Lionville Laboratory Inc. (LLI). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B2LX96	9/10/12	Water	C	See note 1
B2LX97	9/10/12	Water	C	See note 1

1 - Total dissolved solids - 160.1, nitrate/nitrite by 353.2, alkalinity by 310.1, total organic halides (TOX) by 9020B & IC anions - 300.0.

Data validation was conducted in accordance with the WCH validation statement of work and WCH-198, Rev. 0, "Groundwater Protection Plan for the Environmental Restoration Disposal Facility". Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested by Client

DATA QUALITY OBJECTIVES

- **Holding Times & Sample Preparation**

Analytical holding times are assessed to ascertain whether the holding time requirements have been met by the laboratory. The holding time requirements are as follows: 28 days for TOX, chloride, fluoride, bromide, sulfate and nitrate/nitrite; 14 days for alkalinity; 7 days for TDS; and 2 days for nitrate, nitrite and phosphate.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

Due to the samples not being properly preserved (headspace), all alkalinity results were qualified as estimates and flagged "J".

Due to the holding times being exceeded by less than twice the limit, all nitrate, nitrite and orthophosphate results were qualified as estimates and flagged "J".

All other holding time and sample preservation parameters were met.

- **Method Blanks**

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. All blank results must fall below the contract required detection limit (CRQL) to be acceptable.

All method blank results were acceptable.

Field Blanks

No field blanks were submitted for analysis.

- **Accuracy**

Matrix Spike Analysis & Blank Spike Analysis

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75% to 125%. Samples with a spike recovery of less than 30% and a sample value below the instrument detection limit (IDL) are rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified "J". Finally, for samples with a spike recovery greater than 125% and a sample result less than the IDL, no qualification is required.

Due to the lack of a matrix spike analysis, all alkalinity and total dissolved solids results were qualified as estimates and flagged "J".

All other accuracy recovery results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within relative percent difference (RPD) limits of plus or minus 20% for water samples. If RPD values are out of specification and the sample concentration is greater than five times the project quantitation limit (MDL) or

CRQL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the MDL/CRQL and the sample concentration is less than five times the MDL/CRQL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the MDL/CRQL or plus or minus the MDL/CRQL for positive sample results less than five times the MDL/CRQL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate results were acceptable.

Field Duplicate Samples

No field duplicate samples were submitted for analysis.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the minimum detection limits (MDLs) to ensure that laboratory detection levels meet the required criteria. All results met the MDLs.

- **Completeness**

Data package No. K3986 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to the samples not being properly preserved (headspace), all alkalinity results were qualified as estimates and flagged "J".
- Due to the holding times being exceeded by less than twice the limit, all nitrate, nitrite and orthophosphate results were qualified as estimates and flagged "J".
- Due to the lack of a matrix spike analysis, all alkalinity and total dissolved solids results were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*.

WCH-198, Rev 0, *Groundwater Protection Plan for the Environmental Restoration Disposal Facility*, February 2008.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WCH validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

WET CHEMISTRY DATA QUALIFICATION SUMMARY*

SDG: K3986	**REVIEWER: ELR**	**Project: ERDF**	**PAGE 1 OF 1**
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Alkalinity	J	All	Sample preservation (headspace)
Alkalinity TDS	J	All	No MS analysis
Nitrate Nitrite Orthophosphate	J	All	Hold time

* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 2

Summary of Data Qualification

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc.	Project: RC-008	
2620 Fermi Avenue	Project Number: K3986	**Reported:**
Richland WA, 99354	Project Manager: Joan Kessner	10/26/2012 22:48

Wet Chemistry
Lionville Laboratory

11/21/12

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
B2LX96 (1209026-02) Water									
Total Alkalinity	**129** J	0.2	0.5	mg/L	1	L209097	09/14/2012 11:00	09/14/2012 13:15	SM 2320B
Total Dissolved Solids	**295** J	5.0	20.0	mg/L	1	L209077	09/12/2012 15:40	09/12/2012 15:40	SM 2540C
Bromide	0.10 U	0.10	0.50	mg/L	1	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Chloride	**13.6** D	0.50	2.50	mg/L	5	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Fluoride	**0.35** B	0.10	0.50	mg/L	1	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Nitrate	**30.9** D J	0.50	2.50	mg/L	5	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Nitrite	0.10 U J	0.10	0.50	mg/L	1	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Orthophosphate	0.20 U J	0.20	1.00	mg/L	1	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Sulfate	**27.2** D	0.50	2.50	mg/L	5	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Nitrate/Nitrite as N	**6.74** N, D	0.100	0.500	mg/L	10	L209174	09/21/2012 10:00	09/21/2012 11:46	EPA 353.2
Total Organic Halides	20.0 U	20.0	100	ug/L	1	L210065	10/03/2012 06:20	10/03/2012 19:30	9020B
B2LX97 (1209026-04) Water									
Total Alkalinity	**127** J	0.2	0.5	mg/L	1	L209097	09/14/2012 11:00	09/14/2012 13:15	SM 2320B
Total Dissolved Solids	**284** J	5.0	20.0	mg/L	1	L209077	09/12/2012 15:40	09/12/2012 15:40	SM 2540C
Bromide	0.10 U	0.10	0.50	mg/L	1	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Chloride	**13.4** D	0.50	2.50	mg/L	5	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Fluoride	**0.34** B	0.10	0.50	mg/L	1	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Nitrate	**30.4** D J	0.50	2.50	mg/L	5	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Nitrite	0.10 U J	0.10	0.50	mg/L	1	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Orthophosphate	0.20 U J	0.20	1.00	mg/L	1	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Sulfate	**26.9** D	0.50	2.50	mg/L	5	L209104	09/12/2012 09:23	09/12/2012 12:47	EPA 300.0 (1993)
Nitrate/Nitrite as N	**6.92** D	0.100	0.500	mg/L	10	L209174	09/21/2012 10:00	09/21/2012 11:50	EPA 353.2
Total Organic Halides	20.0 U	20.0	100	ug/L	1	L210065	10/03/2012 06:20	10/03/2012 19:30	9020B

Appendix 3

Annotated Laboratory Reports

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, Pennsylvania 19341
Phone (610) 280-3000
Fax (610) 280-3041

Case Narrative

Client: WC-HANFORD RC-008 K3986
LVL#: 1209026 **Date Received:** 09-11-12

INORGANIC NARRATIVE

1. This narrative covers the analyses of 2 water samples.

2. The samples were prepared and analyzed in accordance with the methods indicated on the data summary report.

   Lionville Lab (LvL) is NELAP accredited by the State of Pennsylvania. For a complete list of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager. LvL certifies that all test results meet the requirements of NELAC with any exception noted in the following statements.

3. Sample holding times as required by the method and/or contract were met with the exceptions of Nitrate, Nitrite and Orthophosphate.

4. The results presented in this report are derived from samples that met LvL's sample acceptance policy.

5. The method blanks were within the method criteria.

6. The Laboratory Control Samples (LCS) were within the laboratory control limits.

7. The matrix spike recoveries were within the applicable control limits as noted in the Analytical Report with the exception of Nitrate Nitrite that was above the 90-110% control limits at 114%.

8. The replicate analyses were within the 20% Relative Percent Difference (RPD) control limit.

9. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard copy package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Iain Daniels
Laboratory Manager
Lionville Laboratory

10/26/12
Date

njp\i09-026

Lionville Laboratory

SAMPLE RECEIPT CHECKLIST (SRC)

CLIENT: WC Hanford Date: 9/11/12

Project/SAF/SOW/Release #: RC-0080

LvL Batch #: 1209026 Sample Custodian: Victor Hernandez

NOTE: EXPLAIN ALL DISCREPANCIES

1. Samples Hand Delivered or Shipped?	Carrier FedEx		Airbill # 798930496459
2. Custody Seals on coolers or shipping containers intact, signed & dated?	☑ Yes	☐ No	☐ No Seals
3. Outside of coolers or shipping containers are free from damage?	☑ Yes PSJ 9/12/12	☑ No	Comments: Hole on Bottom leaking Water
4. All expected paperwork received (coc & other client specific information) sealed in plactic bag and easily accessible?	☑ Yes	☐ No	
5. Samples received cooled or ambient?	Temp 2.8°	°C	Cooler # GWS-054
How was the temperature taken?	☑ IR	☐ Temp. Blank	☐ Other (Specify):
Is the Temp. Criteria met for these samples? (Hg in soils @ 4°C)	☑ Yes	☐ No	
6. Custody seals on sample containers intact, signed and dated?	☑ Yes	☐ No	☐ No Seals
7. COC (Client & LvL) signed & dated?	☑ Yes	☐ No	
8. Sample containers are intact?	☑ Yes	☐ No	
9. All samples on COC received?	☑ Yes	☐ No	
All samples received on COC?	☑ Yes	☐ No	
10. All sample label information matches COC?	☑ Yes	☐ No	
11. Samples properly preserved? (If #5 is no, then this is no.)	☑ Yes	☐ No	
12. Samples received within hold times?	☑ Yes	☐ No	
Short holds taken to wet lab?	☑ Yes	☐ No	☐ N/A
13. VOA, TOC, TOX free of headspace? Alkalinity	☐ Yes PSJ 9/12/12	☑ No	☐ N/A
14. QC stickers placed on bottles designated by client?	☐ Yes 9/12/12	☐ No	☑ N/A
15. Shipment meets LvL Sample Acceptance Policy? (Identify all bottles that do not meet the policy, which is on the reverse of this page.)	☐ Yes	☑ No	
16. Project Manager contacted concerning any discrepancies?	☑ Yes	☐ No	☐ N/A
Person Contacted D Johnson		Date 9/12/12	

SR-002-B.doc

000000006

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # RC-008Q-014
		Page 1 of 1

0000000008

Collector	MA White CHPRC	Contact/Requester	WATERS-HUSTED, K	Telephone No.	376-4650
SAF No.	RC-008Q	Sampling Origin	Hanford Site	Purchase Order/Charge Code	302326ES20
Project Title	ERDF, September 2012	Logbook No.	HNF-N-506 36/12	Ice Chest No.	N/A GWS-054
Shipped To (Lab)	Lionville Laboratory Incorporated	Method of Shipment	GOVERNMENT VEHICLE	Bill of Lading/Air Bill No.	N/A 7989-3049-6459
Protocol	GPP	Priority:	45 Days	Offsite Property No.	N/A 4017

POSSIBLE SAMPLE HAZARDS/REMARKS

Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☑ No ☐

**Submit invoices and deliverables to JH Kessner, BHI

**FAX copies of Eberline/Lionville log-in to JH Kessner (1-425-969-4823) and Scot Fitzgerald (509-373-7495).

**Sample Management will send all results to Mike Peloquin.

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B2LX94	Y	W	SEP 1 0 2012	1115	1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX96	N	W			1x1-L aGs*	TOX - 9020	28 Days	H2SO4 to pH <2/Cool~4C
B2LX96	N	W			1x500-mL G/P	TDS - 160.1	7 Days	Cool~4C
B2LX96	N	W			1x20-mL P	Activity Scan	6 Months	None
B2LX96	N	W			1x250-mL G/P	2320_ALKALINITY: Alkalinity (1)	14 Days	Cool~4C
B2LX96	N	W			1x500-mL G/P	NO2/NO3 - 353.2	28 Days	H2SO4 to pH <2/Cool~4C
B2LX96	N	W			1x500-mL P	IC Anions - 300.0	48 Hours	Cool~4C
B2LX96	N	W			1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX96	N	W			3x40-mL aGs*	VOA - 8260A (TCL)	14 Days	HCl or H2SO4 to pH <2/Cool~4C

14

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
MA White CHPRC / MaWhite	SEP 1 0 2012 1250	CFulton / [signature]	9-10-12 1250
CFulton / [signature]	9-10-12 1400	FedEx / [signature]	
FedEx	9/11/12 1439	Victor Hernandez	9-11-12 1439

Matrix *			
S = Soil	DS = Drum Solids	SE = Sediment	DL = Drum Liquids
SO = Solid	T = Tissue	SL = Sludge	WI = Wipe
W = Water	L = Liquid	O = Oil	V = Vegetation
A = Air	X = Other		

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

PRINTED ON 8/2/2012

A-6004-842 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # RC-008Q-015
		Page 1 of 1

Collector MA White CHPRC	Contact/Requester WATERS-HUSTED, K	Telephone No. 376-4650	
SAF No. RC-008Q	Sampling Origin Hanford Site	Purchase Order/Charge Code 302326ES20	
Project Title ERDF, September 2012	Logbook No. HNF-N-506 32/12	Ice Chest No. N/A GWS-054	
Shipped To (Lab) Lionville Laboratory Incorporated	Method of Shipment GOVERNMENT VEHICLE	Bill of Lading/Air Bill No. N/A 7999-3049-6489	
Protocol GPP	Priority: 45 Days	Offsite Property No. N/A 4017	

POSSIBLE SAMPLE HAZARDS/REMARKS

Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SPECIAL INSTRUCTIONS Hold Time — Total Activity Exemption: Yes ☑ No ☐

**Submit invoices and deliverables to JH Kessner, BHI

**FAX copies of Eberline/Lionville log-in to JH Kessner (1-425-969-4823) and Scot Fitzgerald (509-373-7495).

**Sample Management will send all results to Mike Peloquin.

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B2LX95	Y	W	SEP 10 2012	1115	1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX97	N	W			1x1-L aGs*	TOX - 9020	28 Days	H2SO4 to pH <2/Cool~4C
B2LX97	N	W			1x500-mL G/P	TDS - 160.1	7 Days	Cool~4C
B2LX97	N	W			1x20-mL P	Activity Scan	6 Months	None
B2LX97	N	W			1x250-mL G/P	2320_ALKALINITY: Alkalinity (1)	14 Days	Cool~4C
B2LX97	N	W			1x500-mL G/P	NO2/NO3 - 353.2	28 Days	H2SO4 to pH <2/Cool~4C
B2LX97	N	W			1x500-mL P	IC Anions - 300.0	48 Hours	Cool~4C
B2LX97	N	W			1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX97	N	W	↓	↓	3x40-mL aGs*	VOA - 8260A (TCL)	14 Days	HCl or H2SO4 to pH <2/Cool~4C

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
MA White CHPRC	MA White		SEP 10 2012 1250	C Fulton			9-10-12 1250
Relinquished By			Date/Time	Received By			Date/Time
C Fulton			9-10-12 1400	FEDEX			
Relinquished By			Date/Time	Received By			Date/Time
FedEx			9-11-12 1439	Victor Hernandez			9-11-12 1439
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

S = Soil	DS = Drum Solids		
SE = Sediment	DL = Drum Liquids		
SO = Solid	T = Tissue		
SL = Sludge	WI = Wipe		
W = Water	L = Liquid		
O = Oil	V = Vegetation		
A = Air	X = Other		

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

PRINTED ON 8/2/2012

A-6004-842 (REV 2)

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Appendix 5

Data Validation Supporting Documentation

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: ERDF			DATA PACKAGE: K3986		
VALIDATOR: FLR		LAB: LLI		DATE: 11/20/12	
			SDG: K3986		

ANALYSES PERFORMED					
Anions/IC	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI	pH	NO_3/NO_2
Sulfate	TDS	TKN	Phosphate		

SAMPLES/MATRIX
B2LX96 B2LX97
water

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes (No) N/A

Comments: _____

_____

_____

2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)

Initial calibrations performed on all instruments? ..... Yes No (N/A)

Initial calibrations acceptable? ..... Yes No (N/A)

ICV and CCV checks performed on all instruments? ..... Yes No (N/A)

ICV and CCV checks acceptable? ..... Yes No (N/A)

Standards traceable? ..... Yes No (N/A)

Standards expired? ..... Yes No (N/A)

Calculation check acceptable? ..... Yes No (N/A)

Comments: _____

_____

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

3. BLANKS (Levels B, C, D, and E)

ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No (N/A)
ICB and CCB results acceptable? (Levels D, E) ..... Yes No (N/A)
Laboratory blanks analyzed? ..... (Yes) No N/A
Laboratory blank results acceptable? ..... (Yes) No N/A
Field blanks analyzed? (Levels C, D, E) ..... Yes (No) N/A
Field blank results acceptable? (Levels C, D, E) ..... Yes (No) N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No (N/A)
Comments: no FB

4. ACCURACY (Levels C, D, and E)

Spike samples analyzed? ..... (Yes) No N/A
Spike recoveries acceptable? ..... (Yes) No N/A
Sike standards NIST traceable? (Levels D, E) ..... Yes No (N/A)
Spike standards expired? (Levels D, E) ..... Yes No (N/A)
LCS/BSS samples analyzed? ..... (Yes) No N/A
LCS/BSS results acceptable? ..... (Yes) No N/A
Standards traceable? (Levels D, E) ..... Yes No (N/A)
Standards expired? (Levels D, E) ..... Yes No (N/A)
Transcription/calculation errors? (Levels D, E) ..... Yes No (N/A)
Performance audit sample(s) analyzed? ..... Yes (No) N/A
Performance audit sample results acceptable? ..... Yes No (N/A)
Comments: alkalinity + TDS - no MS - Jall

no PAs

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

5. PRECISION (Levels C, D, and E)

Duplicate RPD values acceptable? ..... (Yes) No N/A
Duplicate results acceptable? ..... (Yes) No N/A
MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No (N/A)
MS/MSD standards expired? (Levels D, E) ..... Yes No (N/A)
Field duplicate RPD values acceptable? ..... (Yes) No N/A
Field split RPD values acceptable? ..... Yes (No) N/A
Transcription/calculation errors? (Levels D, E) ..... Yes (No) N/A
Comments: _____

6. HOLDING TIMES (all levels)

Samples properly preserved? ..... Yes (No) N/A
Sample holding times acceptable? ..... Yes (No) N/A
Comments: alkalinity - headspace - J all
nitrate, nitrite + ortho - <2K - J all

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

7. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

Results reported for all requested analyses? ..... Yes No N/A

Results supported in the raw data? (Levels D, E) ..... Yes No N/A

Samples properly prepared? (Levels D, E) ..... Yes No N/A

Detection limits meet RDL? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: _____

Appendix 6

Additional Documentation Requested by Client

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 10/26/2012 22:48

Wet Chemistry - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209077 - Default Prep GenChem										
Blank (L209077-BLK1)				Prepared & Analyzed: 09/12/2012 15:40						
Total Dissolved Solids	5.0 U	5.0	20.0	mg/L						
LCS (L209077-BS1)				Prepared & Analyzed: 09/12/2012 15:40						
Total Dissolved Solids	101	5.0	20.0	mg/L	100.00		101	80-120		
LCS (L209077-BS2)				Prepared & Analyzed: 09/12/2012 15:40						
Total Dissolved Solids	103	5.0	20.0	mg/L	100.00		103	80-120		
Duplicate (L209077-DUP1)	Source: 1209026-02			Prepared & Analyzed: 09/12/2012 15:40						
Total Dissolved Solids	291	5.0	20.0	mg/L		295			1.37	20
Batch L209097 - Default Prep GenChem										
Blank (L209097-BLK1)				Prepared: 09/14/2012 11:00 Analyzed: 09/14/2012 13:15						
Total Alkalinity	0.2 U	0.2	0.5	mg/L						
LCS (L209097-BS1)				Prepared: 09/14/2012 11:00 Analyzed: 09/14/2012 13:15						
Total Alkalinity	103	0.2	0.5	mg/L	100.00		103	90-110		
LCS (L209097-BS2)				Prepared: 09/14/2012 11:00 Analyzed: 09/14/2012 13:15						
Total Alkalinity	98.1	0.2	0.5	mg/L	100.00		98.1	90-110		
Duplicate (L209097-DUP1)	Source: 1209026-02			Prepared: 09/14/2012 11:00 Analyzed: 09/14/2012 13:15						
Total Alkalinity	127	0.2	0.5	mg/L		129			1.74	20
Batch L209104 - Default Prep GenChem										
Blank (L209104-BLK1)				Prepared: 09/12/2012 09:23 Analyzed: 09/12/2012 10:08						
Fluoride	0.10 U	0.10	0.50	mg/L						
Chloride	0.10 U	0.10	0.50	mg/L						
Nitrite	0.10 U	0.10	0.50	mg/L						
Bromide	0.10 U	0.10	0.50	mg/L						
Nitrate	0.10 U	0.10	0.50	mg/L						
Orthophosphate	0.20 U	0.20	1.00	mg/L						
Sulfate	0.10 U	0.10	0.50	mg/L						

Lionville Laboratory, PADEP Lab ID# 15-00009
264 Welsh Pool Road
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WC-Hanford, Inc.	Project: RC-008	
2620 Fermi Avenue	Project Number: K3986	**Reported:**
Richland WA, 99354	Project Manager: Joan Kessner	10/26/2012 22:48

Wet Chemistry - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209104 - Default Prep GenChem										
LCS (L209104-BS1)					Prepared: 09/12/2012 09:23 Analyzed: 09/12/2012 10:08					
Fluoride	5.16	0.10	0.50	mg/L	5.0000		103	90-110		
Chloride	4.96	0.10	0.50	mg/L	5.0000		99.2	90-110		
Nitrite	4.95	0.10	0.50	mg/L	5.0000		99.0	90-110		
Bromide	5.09	0.10	0.50	mg/L	5.0000		102	90-110		
Nitrate	5.13	0.10	0.50	mg/L	5.0000		103	90-110		
Orthophosphate	4.92	0.20	1.00	mg/L	5.0000		98.4	90-110		
Sulfate	5.10	0.10	0.50	mg/L	5.0000		102	90-110		
Duplicate (L209104-DUP1)	**Source: 1209026-02**				Prepared: 09/12/2012 09:23 Analyzed: 09/12/2012 12:47					
Fluoride	0.36 B	0.10	0.50	mg/L		0.35			2.82	20
Chloride	13.3 D	0.50	2.50	mg/L		13.6			1.71	20
Nitrite	0.10 U	0.10	0.50	mg/L		0.10 U				20
Bromide	0.10 U	0.10	0.50	mg/L		0.10 U				20
Nitrate	30.8 D	0.50	2.50	mg/L		30.9			0.422	20
Orthophosphate	0.20 U	0.20	1.00	mg/L		0.20 U				20
Sulfate	27.2 D	0.50	2.50	mg/L		27.2			0.220	20
Matrix Spike (L209104-MS1)	**Source: 1209026-02**				Prepared: 09/12/2012 09:23 Analyzed: 09/12/2012 12:47					
Orthophosphate	5.50	0.20	1.00	mg/L	5.0000	0.20 U	110	80-120		
Matrix Spike (L209104-MS2)	**Source: 1209026-02**				Prepared: 09/12/2012 09:23 Analyzed: 09/12/2012 12:47					
Fluoride	26.1 D	0.50	2.50	mg/L	25.000	0.35	103	80-120		
Chloride	40.2 D	0.50	2.50	mg/L	25.000	13.6	106	80-120		
Nitrite	25.1 D	0.50	2.50	mg/L	25.000	0.10 U	100	80-120		
Bromide	25.0 D	0.50	2.50	mg/L	25.000	0.10 U	100	80-120		
Matrix Spike (L209104-MS3)	**Source: 1209026-02**				Prepared: 09/12/2012 09:23 Analyzed: 09/12/2012 12:47					
Nitrate	79.6 D	1.00	5.00	mg/L	50.000	30.9	97.4	80-120		
Sulfate	75.2 D	1.00	5.00	mg/L	50.000	27.2	95.8	80-120		

Lionville Laboratory, PADEP Lab ID# 15-00009
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WC-Hanford, Inc.	Project: RC-008	
2620 Fermi Avenue	Project Number: K3986	**Reported:**
Richland WA, 99354	Project Manager: Joan Kessner	10/26/2012 22:48

Wet Chemistry - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209174 - Default Prep GenChem										
Blank (L209174-BLK1)					Prepared: 09/21/2012 10:00 Analyzed: 09/21/2012 10:38					
Nitrate/Nitrite as N	0.010 U	0.010	0.050	mg/L						
LCS (L209174-BS1)					Prepared: 09/21/2012 10:00 Analyzed: 09/21/2012 10:37					
Nitrate/Nitrite as N	0.512	0.010	0.050	mg/L	0.51302		100	90-110		
Duplicate (L209174-DUP1)	**Source: 1209026-02**				Prepared: 09/21/2012 10:00 Analyzed: 09/21/2012 11:48					
Nitrate/Nitrite as N	6.94 D	0.100	0.500	mg/L		6.74			3	20
Matrix Spike (L209174-MS1)	**Source: 1209026-02**				Prepared: 09/21/2012 10:00 Analyzed: 09/21/2012 11:49					
Nitrate/Nitrite as N	18.1 D	0.200	1.00	mg/L	10.000	6.74	114*	90-110		
Batch L210065 - Default Prep GenChem										
Blank (L210065-BLK1)					Prepared: 10/03/2012 06:20 Analyzed: 10/03/2012 19:30					
Total Organic Halides	20.0 U	20.0	100	ug/L						
LCS (L210065-BS1)					Prepared: 10/03/2012 06:20 Analyzed: 10/03/2012 19:30					
Total Organic Halides	49.7 B	20.0	100	ug/L	50.000		99	80-120		
Duplicate (L210065-DUP1)	**Source: 1209026-02**				Prepared: 10/03/2012 06:20 Analyzed: 10/03/2012 19:30					
Total Organic Halides	20.0 U	20.0	100	ug/L		20.0 U				20
Matrix Spike (L210065-MS1)	**Source: 1209026-04**				Prepared: 10/03/2012 06:20 Analyzed: 10/03/2012 19:30					
Total Organic Halides	58.2 B	20.0	100	ug/L	50.000	20.0 U	116	75-125		

Date: 21 November 2012
To: Washington Closure Hanford (technical representative)
From: ELR Consulting
Project: ERDF Groundwater Well Samples – September 2012
Subject: Volatiles - Data Package No. K3986-LLI

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. K3986 prepared by Lionville Laboratory Inc. (LLI). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B2LX96	9/10/12	Water	C	See note 1
B2LX97	9/10/12	Water	C	See note 1

1 - Volatiles by EPA 8260B.

Data validation was conducted in accordance with the WCH validation statement of work and WCH-198, Rev. 0, "Groundwater Protection Plan for the Environmental Restoration Disposal Facility". Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested by Client

DATA QUALITY OBJECTIVES

- **Holding Times & Sample Preservation**

Analytical holding times are assessed to ascertain whether the holding time requirements were met by the laboratory. Preserved water samples must be analyzed within: 14 days of the date of sample collection for preserved samples and 7 days for unpreserved samples.

If holding times are exceeded, but not by greater than twice the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than twice the limit, all associated detected sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were acceptable.

- **Blanks**

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples of a given matrix. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the project quantitation limit (PQL) and is less than five times (or less than ten times for laboratory contaminants) the highest associated blank result, the sample result value is raised to the PQL, qualified as undetected and flagged "U".

All method blank results were acceptable.

Field Blanks

No equipment blanks were submitted for analysis.

- **Accuracy**

Matrix Spike/Matrix Spike Duplicate & Laboratory Control Sample

Matrix spike/matrix spike duplicate and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike/matrix spike duplicate is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using the target compounds for which percent recoveries must be within established laboratory quality control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

Surrogate Recovery

The analysis of surrogate compounds provides a measure of system performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory program. When a surrogate compound recovery is out of the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J".

Undetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Samples with surrogate recoveries less than ten percent are qualified as estimates and flagged "J" for detects, and rejected and flagged "UR" for nondetects. Undetected compounds with surrogate recoveries greater than the upper control limit require no qualification.

All surrogate recovery results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. For samples analyzed using SW-846 protocol, results must be within RPD limits of +/- 20% for water samples and +/- 35% for solid samples. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All precision results were acceptable.

Field Duplicate Samples

One set of field duplicate samples (B2LX96)/B2LX97 were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the required detection limits (RDLs) to ensure that laboratory detection levels meet the required criteria. All results met the RDL.

- **Completeness**

Data package No. K3986 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services.*

WCH-198, Rev 0, *Groundwater Protection Plan for the Environmental Restoration Disposal Facility*, February 2008.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validator in compliance with the WCH validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

VOLATILE ORGANIC DATA QUALIFICATION SUMMARY*

SDG: K3986	REVIEWER: ELR	Project: ERDF	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			

* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3

Annotated Laboratory Reports

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

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Phone: 610-280-3000
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WC-Hanford, Inc.	Project: RC-008	
2620 Fermi Avenue	Project Number: K3986	Reported:
Richland WA, 99354	Project Manager: Joan Kessner	09/17/2012 12:57

B2LX96
1209026-02 (Water)

11/24/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Volatile Organic Compounds by SW846 8260B									
1,1,1-Trichloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,1,2,2-Tetrachloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,1,2-Trichloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,1-Dichloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,1-Dichloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,2-Dichloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,2-Dichloroethene (total)	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,2-Dichloropropane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
2-Butanone	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
2-Hexanone	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
4-Methyl-2-pentanone	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Acetone	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Benzene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Bromodichloromethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Bromoform	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Bromomethane	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Carbon Disulfide	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Carbon Tetrachloride	**4.51**	J	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Chlorobenzene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Chloroethane	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Chloroform	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Chloromethane	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
cis-1,2-Dichloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
cis-1,3-Dichloropropene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Dibromochloromethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Ethylbenzene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Methylene Chloride	6.00	U	6.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Styrene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Tetrachloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
trans-1,2-Dichloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Toluene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
trans-1,3-Dichloropropene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Trichloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Vinyl chloride	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Xylenes, total	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Surrogate: 1,2-Dichloroethane-d4	*112 %*		*60-140*			*L209089*	*09/12/2012*	*09/12/2012*	*8260B*

000000019

LIONVILLE LABORATORY
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Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc.	Project: RC-008	
2620 Fermi Avenue	Project Number: K3986	**Reported:**
Richland WA, 99354	Project Manager: Joan Kessner	09/17/2012 12:57

B2LX96
1209026-02 (Water)

11/21/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Volatile Organic Compounds by SW846 8260B								
Surrogate: Toluene-d8	*96 %*	*65-120*			*L209089*	*09/12/2012*	*09/12/2012*	*8260B*
Surrogate: 4-Bromofluorobenzene	*94 %*	*75-130*			*L209089*	*09/12/2012*	*09/12/2012*	*8260B*

000000020

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WC-Hanford, Inc.	Project: RC-008	
2620 Fermi Avenue	Project Number: K3986	Reported:
Richland WA, 99354	Project Manager: Joan Kessner	09/17/2012 12:57

B2LX97
1209026-04 (Water)

11/26/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Volatile Organic Compounds by SW846 8260B									
1,1,1-Trichloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,1,2,2-Tetrachloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,1,2-Trichloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,1-Dichloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,1-Dichloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,2-Dichloroethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,2-Dichloroethene (total)	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
1,2-Dichloropropane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
2-Butanone	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
2-Hexanone	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
4-Methyl-2-pentanone	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Acetone	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Benzene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Bromodichloromethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Bromoform	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Bromomethane	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Carbon Disulfide	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Carbon Tetrachloride	**4.34**	J	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Chlorobenzene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Chloroethane	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Chloroform	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Chloromethane	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
cis-1,2-Dichloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
cis-1,3-Dichloropropene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Dibromochloromethane	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Ethylbenzene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Methylene Chloride	6.00	U	6.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Styrene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Tetrachloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
trans-1,2-Dichloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Toluene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
trans-1,3-Dichloropropene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Trichloroethene	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Vinyl chloride	10.0	U	10.0	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Xylenes, total	5.00	U	5.00	ug/L	1	L209089	09/12/2012	09/12/2012	8260B
Surrogate: 1,2-Dichloroethane-d4	*118 %*		*60-140*			*L209089*	*09/12/2012*	*09/12/2012*	*8260B*

000000021

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 09/17/2012 12:57

Volatile

B2LX97

1209026-04 (Water)

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Volatile Organic Compounds by SW846 8260B								
Surrogate: Toluene-d8	*101 %*	*65-120*			*L209089*	*09/12/2012*	*09/12/2012*	*8260B*
Surrogate: 4-Bromofluorobenzene	*98 %*	*75-130*			*L209089*	*09/12/2012*	*09/12/2012*	*8260B*

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, Pennsylvania 19341
Phone (610) 280-3000
Fax (610) 280-3041

Case Narrative

Client: WC-HANFORD RC-008 K3986
LVL #: 1209025

W.O. #: 60049-001-001-0001-00
Date Received: 09-11-2012

GC/MS VOLATILE

Two (2) water samples were collected on 09-12-2012.

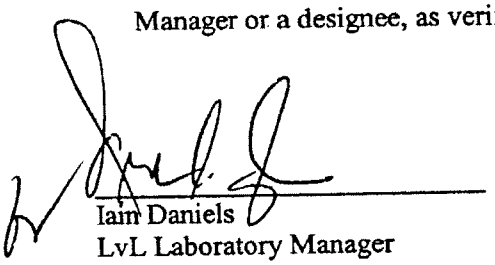
The samples and associated QC samples were prepared and analyzed 09-12-2012 according to criteria set forth in Lionville Laboratory SOPs. The preparation procedure was based on SW846 Method 5030B and the analysis procedure was based on SW846 Method 8260B for TCL Volatile target compounds.

Lionville Laboratory (LvL) is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager. LvL certifies that all test results meet the requirements of NELAC with any exception noted in the following statements:

1. Discrepancies from the sample acceptance policy have been recorded on the Sample Receipt Checklist.
2. Samples were analyzed within holding time.
3. Non-target compounds were not detected in these samples.
4. All obtainable surrogate recoveries were within QC acceptance criteria.
5. All obtainable matrix spike recoveries were within QC acceptance criteria.
6. All blank spike recoveries were within acceptance criteria.
7. The method blank was below the reporting limit for all target analytes.
8. All initial calibrations associated with this data set were within acceptance criteria using the mean RSD described in method 8000B. Per method 8000B/8260B, the attached Table 1 provides the mean RSD and indicates the target compounds where the RSD exceeded 15%; results for the indicated target compounds are considered to have greater uncertainty.
9. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.
10. All internal standard area and retention time criteria were met.

11. Manual integrations are performed according to SOP QA-125 to produce quality data with utmost integrity. All manual integrations are required to be technically valid and properly documented. Appropriate technical flags are defined in the Glossary ("Technical Flags For Manual Integration").

12. "I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."



Iain Daniels
LvL Laboratory Manager

9/27/12
Date

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # RC-008Q-014 Page 1 of 1

Collector	MA White CHPRC	Contact/Requester	WATERS-HUSTED, K
SAF No.	RC-008Q	Sampling Origin	Hanford Site
Project Title	ERDF, September 2012	Logbook No.	HNF-N-506 3/2012
Shipped To (Lab)	Lionville Laboratory Incorporated	Method of Shipment	GOVERNMENT VEHICLE
Protocol	GPP	Priority:	45 Days

Telephone No.	376-4650
Purchase Order/Charge Code	302326ES20
Ice Chest No.	N/A GWS-054
Bill of Lading/Air Bill No.	N/A 7989-3049-6459
Offsite Property No.	N/A 4017

POSSIBLE SAMPLE HAZARDS/REMARKS

Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SPECIAL INSTRUCTIONS Hold Time — Total Activity Exemption: Yes ☑ No ☐

**Submit invoices and deliverables to JH Kessner, BHI
**FAX copies of Eberline/Lionville log-in to JH Kessner (1-425-969-4823) and Scot Fitzgerald (509-373-7495).
**Sample Management will send all results to Mike Peloquin.

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B2LX94	Y	W	SEP 10 2012	1115	1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX96	N	W			1x1-L aGs*	TOX - 9020	28 Days	H2SO4 to pH <2/Cool~4C
B2LX96	N	W			1x500-mL G/P	TDS - 160.1	7 Days	Cool~4C
B2LX96	N	W			1x20-mL P	Activity Scan	6 Months	None
B2LX96	N	W			1x250-mL G/P	2320_ALKALINITY: Alkalinity (1)	14 Days	Cool~4C
B2LX96	N	W			1x500-mL G/P	NO2/NO3 - 353.2	28 Days	H2SO4 to pH <2/Cool~4C
B2LX96	N	W			1x500-mL P	IC Anions - 300.0	48 Hours	Cool~4C
B2LX96	N	W			1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX96	N	W			3x40-mL aGs*	VOA - 8260A (TCL)	14 Days	HCl or H2SO4 to pH <2/Cool~4C

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Relinquished By	Print / Sign	Date/Time	Received By	Print / Sign	Date/Time
MA White CHPRC	MA White	SEP 10 2012 1250	C Fulton	C Fulton	9-10-12 1250
C Fulton	C Fulton	9-10-12 1400	FEDEX		
FedEx		9-11-12 1439	Victor Hernandez		9-11-12 1439
Relinquished By		Date/Time	Received By		Date/Time

Matrix *

S = Soil		DS = Drum Solids	
SB = Sediment		DL = Drum Liquids	
SO = Solid		T = Tissue	
SL = Sludge		WI = Wipe	
W = Water		L = Liquid	
O = Oil		V = Vegetation	
A = Air		X = Other	

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

PRINTED ON 8/2/2012

A-6004-842 (REV 2)

0000000004

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # RC-008Q-015
		Page 1 of 1

Collector MA White CHPRC	Contact/Requester WATERS-HUSTED, K	Telephone No. 376-4650	
SAF No. RC-008Q	Sampling Origin Hanford Site	Purchase Order/Charge Code 302326ES20	
Project Title ERDF, September 2012	Logbook No. HNF-N-506 3e 12	Ice Chest No. N/A GWS-054	
Shipped To (Lab) Lionville Laboratory Incorporated	Method of Shipment GOVERNMENT VEHICLE	Bill of Lading/Air Bill No. N/A 7989-3049-6489	
Protocol GPP	Priority: 45 Days	Offsite Property No. N/A 4017	

POSSIBLE SAMPLE HAZARDS/REMARKS

Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SPECIAL INSTRUCTIONS Hold Time — Total Activity Exemption: Yes ☑ No ☐

**Submit invoices and deliverables to JH Kessner, BHI
**FAX copies of Eberline/Lionville log-in to JH Kessner (1-425-969-4823) and Scot Fitzgerald (509-373-7495).
**Sample Management will send all results to Mike Peloquin.

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B2LX95	Y	W	SEP 10 2012	1115	1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX97	N	W			1x1-L aGs*	TOX - 9020	28 Days	H2SO4 to pH <2/Cool~4C
B2LX97	N	W			1x500-mL G/P	TDS - 160.1	7 Days	Cool~4C
B2LX97	N	W			1x20-mL P	Activity Scan	6 Months	None
B2LX97	N	W			1x250-mL G/P	2320_ALKALINITY: Alkalinity (1)	14 Days	Cool~4C
B2LX97	N	W			1x500-mL G/P	NO2/NO3 - 353.2	28 Days	H2SO4 to pH <2/Cool~4C
B2LX97	N	W			1x500-mL P	IC Anions - 300.0	48 Hours	Cool~4C
B2LX97	N	W			1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX97	N	W			3x40-mL aGs*	VOA - 8260A (TCL)	14 Days	HCl or H2SO4 to pH <2/Cool~4C

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
MA White CHPRC	MA White		SEP 10 2012 1250	CFluton			9-10-12 1250
Relinquished By			Date/Time	Received By			Date/Time
CFluton			9-10-12 1400	FEDEX			
Relinquished By			Date/Time	Received By			Date/Time
FedEx			9-11-12 1439	Victor Hernandez			9-11-12 1439
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

S = Soil		DS = Drum Solids	
SE = Sediment		DL = Drum Liquids	
SO = Solid		T = Tissue	
SL = Sludge		WI = Wipe	
W = Water		L = Liquid	
O = Oil		V = Vegetation	
A = Air		X = Other	

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

A-6004-842 (REV 2)

PRINTED ON 8/2/2012

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Appendix 5

Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: ERDF			DATA PACKAGE: K3986		
VALIDATOR: ELR		LAB: LLI		DATE: 11/20/12	
			SDG: K3986		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX					
B2LX96 B2LX97					
					Water

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes (No) N/A

Comments: _____

2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E)

GC/MS tuning/performance check acceptable? ..... Yes No (N/A)

Initial calibrations acceptable? ..... Yes No (N/A)

Continuing calibrations acceptable? ..... Yes No (N/A)

Standards traceable? ..... Yes No (N/A)

Standards expired? ..... Yes No (N/A)

Calculation check acceptable? ..... Yes No (N/A)

Comments: _____

GC/MS ORGANIC DATA VALIDATION CHECKLIST

3. BLANKS (Levels B, C, D, and E)

Calibration blanks analyzed? (Levels D, E)	Yes	No	N/A
Calibration blank results acceptable? (Levels D, E)	Yes	No	N/A
Laboratory blanks analyzed?	Yes	No	N/A
Laboratory blank results acceptable?	Yes	No	N/A
Field/trip blanks analyzed? (Levels C, D, E)	Yes	No	N/A
Field/trip blank results acceptable? (Levels C, D, E)	Yes	No	N/A
Transcription/calculation errors? (Levels D, E)	Yes	No	N/A

Comments: no FD

4. ACCURACY (Levels C, D, and E)

Surrogates/system monitoring compounds analyzed?	Yes	No	N/A
Surrogate/system monitoring compound recoveries acceptable?	Yes	No	N/A
Surrogates traceable? (Levels D, E)	Yes	No	N/A
Surrogates expired? (Levels D, E)	Yes	No	N/A
MS/MSD samples analyzed?	Yes	No	N/A
MS/MSD results acceptable?	Yes	No	N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes	No	N/A
MS/MSD standards? (Levels D, E)	Yes	No	N/A
LCS/BSS samples analyzed?	Yes	No	N/A
LCS/BSS results acceptable?	Yes	No	N/A
Standards traceable? (Levels D, E)	Yes	No	N/A
Standards expired? (Levels D, E)	Yes	No	N/A
Transcription/calculation errors? (Levels D, E)	Yes	No	N/A
Performance audit sample(s) analyzed?	Yes	No	N/A
Performance audit sample results acceptable?	Yes	No	N/A

Comments: no PAR

GC/MS ORGANIC DATA VALIDATION CHECKLIST

5. PRECISION (Levels C, D, and E)

MS/MSD samples analyzed? ..... Yes No N/A
MS/MSD RPD values acceptable? ..... Yes No N/A
MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A
MS/MSD standards expired? (Levels D, E) ..... Yes No N/A
Field duplicate RPD values acceptable? ..... Yes No N/A
Field split RPD values acceptable? ..... Yes No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No N/A
Comments: _____

6. SYSTEM PERFORMANCE (Levels D and E)

Internal standards analyzed? ..... Yes No N/A
Iinternal standard areas acceptable? ..... Yes No N/A
Internal standard retention times acceptable? ..... Yes No N/A
Standards traceable? ..... Yes No N/A
Standards expired? ..... Yes No N/A
Transcription/calculation errors? ..... Yes No N/A
Comments: _____

7. HOLDING TIMES (all levels)

Samples properly preserved? ..... Yes No N/A
Sample holding times acceptable? ..... Yes No N/A
Comments: _____

GC/MS ORGANIC DATA VALIDATION CHECKLIST

8. COMPOUND IDENTIFICATION, QUANTITATION, AND DETECTION LIMITS (all levels)

Compound identification acceptable? (Levels D, E) ..... Yes No N/A
Compound quantitation acceptable? (Levels D, E) ..... Yes No N/A
Results reported for all requested analyses? ..... Yes No N/A
Results supported in the raw data? (Levels D, E) ..... Yes No N/A
Samples properly prepared? (Levels D, E) ..... Yes No N/A
Laboratory properly identified and coded all TIC? (Levels D, E) ..... Yes No N/A
Detection limits meet RDL? ..... Yes No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No N/A
Comments: _____

9. SAMPLE CLEANUP (Levels D and E)

GPC cleanup performed? ..... Yes No N/A
GPC check performed? ..... Yes No N/A
GPC check recoveries acceptable? ..... Yes No N/A
GPC calibration performed? ..... Yes No N/A
GPC calibration check performed? ..... Yes No N/A
GPC calibration check retention times acceptable? ..... Yes No N/A
Check/calibration materials traceable? ..... Yes No N/A
Check/calibration materials Expired? ..... Yes No N/A
Analytical batch QC given similar cleanup? ..... Yes No N/A
Transcription/Calculation Errors? ..... Yes No N/A
Comments: _____

Appendix 6

Additional Documentation Requested by Client

LVL
LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc.	Project: RC-008	
2620 Fermi Avenue	Project Number: K3986	Reported:
Richland WA, 99354	Project Manager: Joan Kessner	09/17/2012 12:57

Volatile Organic Compounds by SW846 8260B - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209089 - SW 5030B										
Blank (L209089-BLK1)				Prepared & Analyzed: 09/12/2012						
1,1,1-Trichloroethane	5.00	U	5.00	ug/L						
1,1,2,2-Tetrachloroethane	5.00	U	5.00	ug/L						
1,1,2-Trichloroethane	5.00	U	5.00	ug/L						
1,1-Dichloroethane	5.00	U	5.00	ug/L						
1,1-Dichloroethene	5.00	U	5.00	ug/L						
1,2-Dichloroethane	5.00	U	5.00	ug/L						
1,2-Dichloroethene (total)	5.00	U	5.00	ug/L						
1,2-Dichloropropane	5.00	U	5.00	ug/L						
2-Butanone	10.0	U	10.0	ug/L						
2-Hexanone	10.0	U	10.0	ug/L						
4-Methyl-2-pentanone	10.0	U	10.0	ug/L						
Acetone	10.0	U	10.0	ug/L						
Benzene	5.00	U	5.00	ug/L						
Bromodichloromethane	5.00	U	5.00	ug/L						
Bromoform	5.00	U	5.00	ug/L						
Bromomethane	10.0	U	10.0	ug/L						
Carbon Disulfide	5.00	U	5.00	ug/L						
Carbon Tetrachloride	5.00	U	5.00	ug/L						
Chlorobenzene	5.00	U	5.00	ug/L						
Chloroethane	10.0	U	10.0	ug/L						
Chloroform	5.00	U	5.00	ug/L						
Chloromethane	10.0	U	10.0	ug/L						
cis-1,2-Dichloroethene	5.00	U	5.00	ug/L						
cis-1,3-Dichloropropene	5.00	U	5.00	ug/L						
Dibromochloromethane	5.00	U	5.00	ug/L						
Ethylbenzene	5.00	U	5.00	ug/L						
Methylene Chloride	6.00	U	6.00	ug/L						
Styrene	5.00	U	5.00	ug/L						
Tetrachloroethene	5.00	U	5.00	ug/L						
trans-1,2-Dichloroethene	5.00	U	5.00	ug/L						
Toluene	5.00	U	5.00	ug/L						
trans-1,3-Dichloropropene	5.00	U	5.00	ug/L						
Trichloroethene	5.00	U	5.00	ug/L						
Vinyl chloride	10.0	U	10.0	ug/L						
Xylenes, total	5.00	U	5.00	ug/L						
Surrogate: 1,2-Dichloroethane-d4	*53.5*			*ug/L*	*50.000*		*107*	*60-140*		

000000023

LVL
LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 09/17/2012 12:57

Volatile Organic Compounds by SW846 8260B - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209089 - SW 5030B									
Blank (L209089-BLK1)			Prepared & Analyzed: 09/12/2012						
Surrogate: Toluene-d8	*48.9*		*ug/L*	*50.000*		*98*	*65-120*		
Surrogate: 4-Bromofluorobenzene	*49.4*		*ug/L*	*50.000*		*99*	*75-130*		
LCS (L209089-BS1)			Prepared & Analyzed: 09/12/2012						
1,1,1-Trichloroethane	53.7	5.00	ug/L	50.000		107	70-130		
1,1,2,2-Tetrachloroethane	44.2	5.00	ug/L	50.000		88	65-130		
1,1,2-Trichloroethane	44.9	5.00	ug/L	50.000		90	70-125		
1,1-Dichloroethane	50.2	5.00	ug/L	50.000		100	70-130		
1,1-Dichloroethene	47.1	5.00	ug/L	50.000		94	65-140		
1,2-Dichloroethane	52.2	5.00	ug/L	50.000		104	60-140		
1,2-Dichloroethene (total)	97.1	5.00	ug/L	100.00		97	70-130		
1,2-Dichloropropane	48.1	5.00	ug/L	50.000		96	75-125		
2-Butanone	48.1	10.0	ug/L	50.000		96	20-200		
2-Hexanone	49.0	10.0	ug/L	50.000		98	20-200		
4-Methyl-2-pentanone	41.4	10.0	ug/L	50.000		83	45-150		
Acetone	73.0	10.0	ug/L	50.000		146	20-220		
Benzene	48.4	5.00	ug/L	50.000		97	75-125		
Bromodichloromethane	51.7	5.00	ug/L	50.000		103	65-130		
Bromoform	48.6	5.00	ug/L	50.000		97	70-120		
Bromomethane	47.2	10.0	ug/L	50.000		94	50-150		
Carbon Disulfide	47.5	5.00	ug/L	50.000		95	50-150		
Carbon Tetrachloride	55.8	5.00	ug/L	50.000		112	65-130		
Chlorobenzene	47.6	5.00	ug/L	50.000		95	75-125		
Chloroethane	48.7	10.0	ug/L	50.000		97	65-140		
Chloroform	53.2	5.00	ug/L	50.000		106	75-125		
Chloromethane	51.1	10.0	ug/L	50.000		102	50-135		
cis-1,2-Dichloroethene	48.1	5.00	ug/L	50.000		96	70-125		
cis-1,3-Dichloropropene	43.6	5.00	ug/L	50.000		87	70-125		
Dibromochloromethane	48.8	5.00	ug/L	50.000		98	70-130		
Ethylbenzene	50.4	5.00	ug/L	50.000		101	75-125		
Methylene Chloride	47.4	6.00	ug/L	50.000		95	55-150		
Styrene	49.3	5.00	ug/L	50.000		99	75-130		
Tetrachloroethene	48.3	5.00	ug/L	50.000		97	70-130		
trans-1,2-Dichloroethene	49.0	5.00	ug/L	50.000		98	70-130		
Toluene	47.3	5.00	ug/L	50.000		95	70-130		
trans-1,3-Dichloropropene	48.9	5.00	ug/L	50.000		98	70-130		
Trichloroethene	48.9	5.00	ug/L	50.000		98	75-125		

LVL
LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc.	Project: RC-008	
2620 Fermi Avenue	Project Number: K3986	Reported:
Richland WA, 99354	Project Manager: Joan Kessner	09/17/2012 12:57

Volatile Organic Compounds by SW846 8260B - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209089 - SW 5030B									
LCS (L209089-BS1)			Prepared & Analyzed: 09/12/2012						
Vinyl chloride	51.8	10.0	ug/L	50.000		104	55-135		
Xylenes, total	149	5.00	ug/L	150.00		99	70-130		
Surrogate: 1,2-Dichloroethane-d4	*51.6*		*ug/L*	*50.000*		*103*	*60-140*		
Surrogate: Toluene-d8	*48.0*		*ug/L*	*50.000*		*96*	*65-120*		
Surrogate: 4-Bromofluorobenzene	*48.7*		*ug/L*	*50.000*		*97*	*75-130*		
Matrix Spike (L209089-MS2)		**Source: 1209026-04**	Prepared & Analyzed: 09/12/2012						
1,1,1-Trichloroethane	50.7	5.00	ug/L	50.000	5.00 U	101	70-130		
1,1,2,2-Tetrachloroethane	38.7	5.00	ug/L	50.000	5.00 U	77	65-130		
1,1,2-Trichloroethane	42.5	5.00	ug/L	50.000	5.00 U	85	70-125		
1,1-Dichloroethane	48.2	5.00	ug/L	50.000	5.00 U	96	70-130		
1,1-Dichloroethene	43.8	5.00	ug/L	50.000	5.00 U	88	65-140		
1,2-Dichloroethane	49.4	5.00	ug/L	50.000	5.00 U	99	60-140		
1,2-Dichloroethene (total)	91.6	5.00	ug/L	100.00	5.00 U	92	70-130		
1,2-Dichloropropane	47.1	5.00	ug/L	50.000	5.00 U	94	75-125		
2-Butanone	34.4	10.0	ug/L	50.000	10.0 U	69	20-200		
2-Hexanone	31.3	10.0	ug/L	50.000	10.0 U	63	20-200		
4-Methyl-2-pentanone	32.7	10.0	ug/L	50.000	10.0 U	65	45-150		
Acetone	32.8	10.0	ug/L	50.000	10.0 U	66	20-220		
Benzene	46.9	5.00	ug/L	50.000	5.00 U	94	75-125		
Bromodichloromethane	50.0	5.00	ug/L	50.000	5.00 U	100	65-130		
Bromoform	43.1	5.00	ug/L	50.000	5.00 U	86	70-120		
Bromomethane	44.4	10.0	ug/L	50.000	10.0 U	89	50-150		
Carbon Disulfide	45.6	5.00	ug/L	50.000	5.00 U	91	50-150		
Carbon Tetrachloride	57.2	5.00	ug/L	50.000	4.34	106	65-130		
Chlorobenzene	46.0	5.00	ug/L	50.000	5.00 U	92	75-125		
Chloroethane	47.7	10.0	ug/L	50.000	10.0 U	95	65-140		
Chloroform	51.3	5.00	ug/L	50.000	5.00 U	103	75-125		
Chloromethane	44.3	10.0	ug/L	50.000	10.0 U	89	50-135		
cis-1,2-Dichloroethene	45.6	5.00	ug/L	50.000	5.00 U	91	70-125		
cis-1,3-Dichloropropene	40.5	5.00	ug/L	50.000	5.00 U	81	70-125		
Dibromochloromethane	44.5	5.00	ug/L	50.000	5.00 U	89	70-130		
Ethylbenzene	48.6	5.00	ug/L	50.000	5.00 U	97	75-125		
Methylene Chloride	45.0	6.00	ug/L	50.000	6.00 U	90	55-150		
Styrene	47.4	5.00	ug/L	50.000	5.00 U	95	75-130		
Tetrachloroethene	47.4	5.00	ug/L	50.000	5.00 U	95	70-130		
trans-1,2-Dichloroethene	46.0	5.00	ug/L	50.000	5.00 U	92	70-130		

LVL
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A division of Eberline Analytical Corporation

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	Reported: 09/17/2012 12:57

Volatile Organic Compounds by SW846 8260B - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209089 - SW 5030B									
Matrix Spike (L209089-MS2)	Source: 1209026-04		Prepared & Analyzed: 09/12/2012						
Toluene	45.5	5.00	ug/L	50.000	5.00 U	91	70-130		
trans-1,3-Dichloropropene	45.1	5.00	ug/L	50.000	5.00 U	90	70-130		
Trichloroethene	46.9	5.00	ug/L	50.000	5.00 U	94	75-125		
Vinyl chloride	43.7	10.0	ug/L	50.000	10.0 U	87	55-135		
Xylenes, total	143	5.00	ug/L	150.00	5.00 U	95	70-130		
Surrogate: 1,2-Dichloroethane-d4	*51.6*		*ug/L*	*50.000*		*103*	*60-140*		
Surrogate: Toluene-d8	*49.1*		*ug/L*	*50.000*		*98*	*65-120*		
Surrogate: 4-Bromofluorobenzene	*50.2*		*ug/L*	*50.000*		*100*	*75-130*		
Matrix Spike Dup (L209089-MSD2)	Source: 1209026-04		Prepared & Analyzed: 09/12/2012						
1,1,1-Trichloroethane	51.7	5.00	ug/L	50.000	5.00 U	103	70-130	2	20
1,1,2,2-Tetrachloroethane	40.0	5.00	ug/L	50.000	5.00 U	80	65-130	3	20
1,1,2-Trichloroethane	45.0	5.00	ug/L	50.000	5.00 U	90	70-125	6	20
1,1-Dichloroethane	49.1	5.00	ug/L	50.000	5.00 U	98	70-130	2	20
1,1-Dichloroethene	45.9	5.00	ug/L	50.000	5.00 U	92	65-140	5	20
1,2-Dichloroethane	52.2	5.00	ug/L	50.000	5.00 U	104	60-140	5	20
1,2-Dichloroethene (total)	93.3	5.00	ug/L	100.00	5.00 U	93	70-130	2	20
1,2-Dichloropropane	48.7	5.00	ug/L	50.000	5.00 U	97	75-125	3	20
2-Butanone	36.4	10.0	ug/L	50.000	10.0 U	73	20-200	6	20
2-Hexanone	36.9	10.0	ug/L	50.000	10.0 U	74	20-200	16	20
4-Methyl-2-pentanone	36.8	10.0	ug/L	50.000	10.0 U	74	45-150	12	20
Acetone	36.2	10.0	ug/L	50.000	10.0 U	72	20-220	10	20
Benzene	48.4	5.00	ug/L	50.000	5.00 U	97	75-125	3	20
Bromodichloromethane	50.6	5.00	ug/L	50.000	5.00 U	101	65-130	1	20
Bromoform	46.1	5.00	ug/L	50.000	5.00 U	92	70-120	7	20
Bromomethane	47.6	10.0	ug/L	50.000	10.0 U	95	50-150	7	20
Carbon Disulfide	45.8	5.00	ug/L	50.000	5.00 U	92	50-150	0.5	20
Carbon Tetrachloride	60.5	5.00	ug/L	50.000	4.34	112	65-130	6	20
Chlorobenzene	48.5	5.00	ug/L	50.000	5.00 U	97	75-125	5	20
Chloroethane	49.5	10.0	ug/L	50.000	10.0 U	99	65-140	4	20
Chloroform	53.2	5.00	ug/L	50.000	5.00 U	106	75-125	4	20
Chloromethane	46.9	10.0	ug/L	50.000	10.0 U	94	50-135	6	20
cis-1,2-Dichloroethene	46.5	5.00	ug/L	50.000	5.00 U	93	70-125	2	20
cis-1,3-Dichloropropene	42.0	5.00	ug/L	50.000	5.00 U	84	70-125	4	20
Dibromochloromethane	50.1	5.00	ug/L	50.000	5.00 U	100	70-130	12	20
Ethylbenzene	51.1	5.00	ug/L	50.000	5.00 U	102	75-125	5	20
Methylene Chloride	47.6	6.00	ug/L	50.000	6.00 U	95	55-150	5	20

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 09/17/2012 12:57

Volatile Organic Compounds by SW846 8260B - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209089 - SW 5030B									
Matrix Spike Dup (L209089-MSD2)	**Source: 1209026-04**		Prepared & Analyzed: 09/12/2012						
Styrene	49.9	5.00	ug/L	50.000	5.00 U	100	75-130	5	20
Tetrachloroethene	49.3	5.00	ug/L	50.000	5.00 U	99	70-130	4	20
trans-1,2-Dichloroethene	46.9	5.00	ug/L	50.000	5.00 U	94	70-130	2	20
Toluene	46.9	5.00	ug/L	50.000	5.00 U	94	70-130	3	20
trans-1,3-Dichloropropene	48.8	5.00	ug/L	50.000	5.00 U	98	70-130	8	20
Trichloroethene	49.7	5.00	ug/L	50.000	5.00 U	99	75-125	6	20
Vinyl chloride	44.7	10.0	ug/L	50.000	10.0 U	89	55-135	2	20
Xylenes, total	151	5.00	ug/L	150.00	5.00 U	101	70-130	6	20
Surrogate: 1,2-Dichloroethane-d4	*51.3*		*ug/L*	*50.000*		*103*	*60-140*		
Surrogate: Toluene-d8	*49.0*		*ug/L*	*50.000*		*98*	*65-120*		
Surrogate: 4-Bromofluorobenzene	*48.6*		*ug/L*	*50.000*		*97*	*75-130*		

Date: 21 November 2012
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: ERDF Groundwater Well Samples – September 2012
Subject: Inorganics - Data Package No. K3986-LLI

INTRODUCTION

This memo presents the results of data validation on Data Package No. K3986 prepared by Lionville Laboratory Inc. (LLI). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B2LX94	9/10/12	Water	C	See note 1
B2LX95	9/10/12	Water	C	See note 1
B2LX96	9/10/12	Water	C	See note 1
B2LX97	9/10/12	Water	C	See note 1

1 - ICP metals by 6010B.

Data validation was conducted in accordance with the WCH validation statement of work and WCH-198, Rev. 0, "Groundwater Protection Plan for the Environmental Restoration Disposal Facility". Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested by Client

DATA QUALITY OBJECTIVES

· Holding Times & Sample Preservation

Analytical holding times for ICP metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Samples must be analyzed within six (6) months for ICP metals.

All sample preservation and holding times were met.

- **Blanks**

Preparation (Method) Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations (in ug/L) less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

Due to method blank contamination, all aluminum and manganese results were qualified as undetected and flagged "UJ".

All other preparation blank results were acceptable.

Field Blanks

No field blanks were submitted for analysis.

- **Accuracy**

Matrix Spike and Laboratory Control Sample

Matrix spike (MS) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 75% to 125%. Samples with a recovery of less than 25% and a sample result below the instrument detection limit (IDL) are rejected and flagged "UR". Samples with a recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 125% and a sample result less than the IDL, no qualification is required.

All accuracy results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within relative percent difference (RPD) limits of plus or minus 20% for water samples. If RPD values are out of specification and the ample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate results were acceptable.

Field Duplicate Samples

Two sets of field duplicate samples (B2LX94/B2LX95 & B2LX96/B2LX97) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the required quantitation limits (RQLs) to ensure that laboratory detection levels meet the required criteria. All laboratory detection levels met the analyte specific RQL.

- **Completeness**

Data package No. K3986 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to method blank contamination, all aluminum and manganese results were qualified as undetected and flagged "UJ".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*.

WCH-198, Rev 0, *Groundwater Protection Plan for the Environmental Restoration Disposal Facility*, February 2008.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WCH validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

INORGANICS ORGANIC DATA QUALIFICATION SUMMARY*

SDG: K3986	**REVIEWER: ELR**	**Project: ERDF**	**PAGE 1 OF 1**
COMPOUND	QUALIFIER	SAMPLES	REASON
Aluminum Manganese	UJ	All	Method blank contamination

* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3

Annotated Laboratory Reports

LIONVILLE LABORATORY
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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 09/18/2012 12:58

B2LX94
1209026-01 (Water)

11/21/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	27.9 B U J	50.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Antimony	6.00 U	6.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Arsenic	2.91 B	4.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Barium	44.6	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Cadmium	2.00 U	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Calcium	41300	1000	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Chromium	4.25	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Cobalt	20.0 U	20.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Copper	10.0 U	10.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Iron	22.8 B	50.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Lead	5.00 U	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Magnesium	13100	750	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Manganese	1.20 B U J	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Nickel	1.70 B	40.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Potassium	4610	4000	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Selenium	4.16 B	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Silver	2.00 U	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Sodium	16500	500	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Tin	1.00 U	1.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Vanadium	39.4	25.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Zinc	10.0 U	10.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 09/18/2012 12:58

B2LX95
1209026-03 (Water) 11/21/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	**15.2** B UJ	50.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Antimony	6.00 U	6.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Arsenic	**3.28** B	4.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Barium	**45.0**	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Cadmium	2.00 U	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Calcium	**41400**	1000	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Chromium	**3.99**	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Cobalt	20.0 U	20.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Copper	10.0 U	10.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Iron	**18.8** B	50.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Lead	5.00 U	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Magnesium	**13100**	750	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Manganese	**1.22** B UJ	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Nickel	**1.58** B	40.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Potassium	**4630**	4000	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Selenium	**4.16** B	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Silver	2.00 U	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Sodium	**16500**	500	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Tin	1.00 U	1.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Vanadium	**38.8**	25.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Zinc	10.0 U	10.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 09/18/2012 12:58

B2LX96
1209026-02 (Water)

11/21/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Metals by SW846 6000/7000 series									
Aluminum	**27.0**	B U J	50.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Antimony	6.00	U	6.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Arsenic	**3.31**	B	4.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Barium	**45.6**		5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Cadmium	2.00	U	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Calcium	**41600**		1000	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Chromium	**24.2**		2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Cobalt	20.0	U	20.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Copper	10.0	U	10.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Iron	**103**		50.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Lead	5.00	U	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Magnesium	**13200**		750	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Manganese	**3.14**	B U J	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Nickel	**10.5**	B	40.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Potassium	**4670**		4000	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Selenium	**4.03**	B	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Silver	2.00	U	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Sodium	**16800**		500	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Tin	1.00	U	1.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Vanadium	**40.0**		25.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Zinc	10.0	U	10.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B

LVL
LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	Reported: 09/18/2012 12:58

11/21/12

B2LX97
1209026-04 (Water)

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	**22.7** B UJ	50.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Antimony	6.00 U	6.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Arsenic	**3.58** B	4.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Barium	**44.3**	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Cadmium	2.00 U	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Calcium	**40900**	1000	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Chromium	**25.1**	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Cobalt	20.0 U	20.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Copper	10.0 U	10.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Iron	**104**	50.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Lead	5.00 U	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Magnesium	**12900**	750	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Manganese	**2.81** B UJ	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Nickel	**10.9** B	40.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Potassium	**4580**	4000	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Selenium	**4.01** B	5.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Silver	2.00 U	2.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Sodium	**16200**	500	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Tin	1.00 U	1.00	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Vanadium	**38.4**	25.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B
Zinc	**27.1**	10.0	ug/L	1	L209076	09/12/2012	09/17/2012	6010B

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, Pennsylvania 19341
Phone (610) 280-3000
Fax (610) 280-3041

Case Narrative

Client: WC-HANFORD RC-008
LVL#: 1209026
SDG/SAF#: K3986/RC-008

W.O.#: 60049-001-001-0001-00
Date Received: 09-11-12

METALS

The following is a summary of the QC results accompanying the sample results. Lionville Laboratory (LvL) certifies that all test results meet the requirements of NELAC except as noted below.

1. This narrative covers the analyses of 4 water samples.

2. The samples were prepared and analyzed in accordance with methods listed on the data report forms.

3. All analyses were performed within the required holding times.

4. Please refer to the Sample Receipt Check List for any sample discrepancies in LvL's sample acceptance policy.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits.

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the LOQ).

7. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation, samples greater than 20X MB value}.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control samples (LCS) were within the 80-120% control limits.

10. All matrix spike (MS) recoveries were within the 75-125% control limits.

11. All duplicate analyses were within the 20% Relative Percent Difference (RPD) control limit critieria. The ± 20% RPD control limit applies to sample results greater than ten times the MDL. The sample result for Selenium was less than ten times the MDL.

12. For the purposes of this report, the data have been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.

13. LvL is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.

14. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Iain Daniels
Laboratory Manager
Lionville Laboratory

9/26/12
Date

alm/09-026

CH2MHill Plateau Remediation Company	**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**	C.O.C. # RC-008Q-014
		Page 1 of 1

Collector MA White CHPRC	Contact/Requester WATERS-HUSTED, K	Telephone No. 376-4650	
SAF No. RC-008Q	Sampling Origin Hanford Site	Purchase Order/Charge Code 302326ES20	
Project Title ERDF, September 2012	Logbook No. HNF-N-506 3/6/12	Ice Chest No. N/A GWS-054	
Shipped To (Lab) Lionville Laboratory Incorporated	Method of Shipment GOVERNMENT VEHICLE	Bill of Lading/Air Bill No. N/A 7989-3049-6459	
Protocol GPP	Priority: 45 Days	Offsite Property No. N/A 4017	

POSSIBLE SAMPLE HAZARDS/REMARKS

Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SPECIAL INSTRUCTIONS Hold Time — Total Activity Exemption: Yes ☑ No ☐

**Submit invoices and deliverables to JH Kessner, BHI
**FAX copies of Eberline/Lionville log-in to JH Kessner (1-425-969-4823) and Scot Fitzgerald (509-373-7495).
**Sample Management will send all results to Mike Peloquin.

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B2LX94	Y	W	SEP 10 2012	1115	1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX96	N	W			1x1-L aGs*	TOX - 9020	28 Days	H2SO4 to pH <2/Cool~4C
B2LX96	N	W			1x500-mL G/P	TDS - 160.1	7 Days	Cool~4C
B2LX96	N	W			1x20-mL P	Activity Scan	6 Months	None
B2LX96	N	W			1x250-mL G/P	2320_ALKALINITY: Alkalinity (1)	14 Days	Cool~4C
B2LX96	N	W			1x500-mL G/P	NO2/NO3 - 353.2	28 Days	H2SO4 to pH <2/Cool~4C
B2LX96	N	W			1x500-mL P	IC Anions - 300.0	48 Hours	Cool~4C
B2LX96	N	W			1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX96	N	W			3x40-mL aGs*	VOA - 8260A (TCL)	14 Days	HCl or H2SO4 to pH <2/Cool~4C

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Relinquished By	Print / Sign	Date/Time	Received By	Print / Sign	Date/Time
MA White CHPRC	MA White	SEP 10 2012 1250	C Fulton	C Fulton	9-10-12 1250
C Fulton	C Fulton	9-10-12 1400	FedEx		
FedEx		9-11-12 1439	Victor Hernandez		9-11-12 1439
Relinquished By		Date/Time	Received By		Date/Time

Matrix *

S = Soil	DS = Drum Solids		
SE = Sediment	DL = Drum Liquids		
SO = Solid	T = Tissue		
SL = Sludge	WI = Wipe		
W = Water	L = Liquid		
O = Oil	V = Vegetation		
A = Air	X = Other		

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

A-6004-842 (REV 2)

PRINTED ON 8/2/2012

0000000004

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # RC-008Q-015 Page 1 of 1

Collector MA White CHPRC	Contact/Requester WATERS-HUSTED, K	Telephone No. 376-4650	
SAF No. RC-008Q	Sampling Origin Hanford Site	Purchase Order/Charge Code 302326ES20	
Project Title ERDF, September 2012	Logbook No. HNF-N-506 36/12	Ice Chest No. N/A GWS-054	
Shipped To (Lab) Lionville Laboratory Incorporated	Method of Shipment GOVERNMENT VEHICLE	Bill of Lading/Air Bill No. N/A 7999-3049-6450	
Protocol GPP	Priority: 45 Days	Offsite Property No. N/A 4017	

POSSIBLE SAMPLE HAZARDS/REMARKS

Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☑ No ☐

**Submit invoices and deliverables to JH Kessner, BHI
**FAX copies of Eberline/Lionville log-in to JH Kessner (1-425-969-4823) and Scot Fitzgerald (509-373-7495).
**Sample Management will send all results to Mike Peloquin.

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B2LX95	Y	W	SEP 10 2012	115	1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX97	N	W			1x1-L aGs*	TOX - 9020	28 Days	H2SO4 to pH <2/Cool~4C
B2LX97	N	W			1x500-mL G/P	TDS - 160.1	7 Days	Cool~4C
B2LX97	N	W			1x20-mL P	Activity Scan	6 Months	None
B2LX97	N	W			1x250-mL G/P	2320_ALKALINITY: Alkalinity (1)	14 Days	Cool~4C
B2LX97	N	W			1x500-mL G/P	NO2/NO3 - 353.2	28 Days	H2SO4 to pH <2/Cool~4C
B2LX97	N	W			1x500-mL P	IC Anions - 300.0	48 Hours	Cool~4C
B2LX97	N	W			1x500-mL G/P	6010_METALS_ICP_TR: List-3 (8)	6 Months	HNO3 to pH <2
B2LX97	N	W			3x40-mL aGs*	VOA - 8260A (TCL)	14 Days	HCl or H2SO4 to pH <2/Cool~4C

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
MA White CHPRC	MA White		SEP 10 2012 1250	C Fulton			9-10-12 1250
Relinquished By			Date/Time	Received By			Date/Time
C Fulton			9-10-12 1400	FEDEX			
Relinquished By			Date/Time	Received By			Date/Time
FedEx			9-11-12 1439	Victor Hernandez			9-11-12 1439
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

S = Soil	DS = Drum Solids		
SE = Sediment	DL = Drum Liquids		
SO = Solid	T = Tissue		
SL = Sludge	WI = Wipe		
W = Water	L = Liquid		
O = Oil	V = Vegetation		
A = Air	X = Other		

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

PRINTED ON 8/2/2012

A-6004-842 (REV 2)

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Appendix 5

Data Validation Supporting Documentation Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: ERDF			DATA PACKAGE: K3984		
VALIDATOR: ELR		LAB: LLI		DATE: 11/20/12	
			SDG: K3984		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		
SAMPLES/MATRIX					
B2LX94 B2LX95 B2LX96 B2LX97					
			Water		

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes (No) N/A

Comments: _____

2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)

Initial calibrations performed on all instruments? ..... Yes No N/A

Initial calibrations acceptable? ..... Yes No N/A

ICP interference checks acceptable? ..... Yes No N/A

ICV and CCV checks performed on all instruments? ..... Yes No N/A

ICV and CCV checks acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. BLANKS (Levels B, C, D, and E)

ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No N/A

ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A

Laboratory blanks analyzed? ..... Yes No N/A

Laboratory blank results acceptable? ..... Yes No N/A

Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A

Field blank results acceptable? (Levels C, D, E) ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: aluminum + manganese – U J all

no FB

4. ACCURACY (Levels C, D, and E)

MS/MSD samples analyzed? ..... Yes No N/A

MS/MSD results acceptable? ..... Yes No N/A

MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A

MS/MSD standards expired? (Levels D, E) ..... Yes No N/A

LCS/BSS samples analyzed? ..... Yes No N/A

LCS/BSS results acceptable? ..... Yes No N/A

Standards traceable? (Levels D, E) ..... Yes No N/A

Standards expired? (Levels D, E) ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Performance audit sample(s) analyzed? ..... Yes No N/A

Performance audit sample results acceptable? ..... Yes No N/A

Comments: no PAS

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

5. PRECISION (Levels C, D, and E)

Duplicate RPD values acceptable?	Yes	No	N/A
Duplicate results acceptable?	Yes	No	N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes	No	N/A
MS/MSD standards expired? (Levels D, E)	Yes	No	N/A
Field duplicate RPD values acceptable?	Yes	No	N/A
Field split RPD values acceptable?	Yes	No	N/A
Transcription/calculation errors? (Levels D, E)	Yes	No	N/A

Comments:_____

6. ICP QUALITY CONTROL (Levels D and E)

ICP serial dilution samples analyzed?	Yes	No	N/A
ICP serial dilution %D values acceptable?	Yes	No	N/A
ICP post digestion spike required?	Yes	No	N/A
ICP post digestion spike values acceptable?	Yes	No	N/A
Standards traceable?	Yes	No	N/A
Standards expired?	Yes	No	N/A
Transcription/calculation errors?	Yes	No	N/A

Comments:_____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

7. FURNACE AA QUALITY CONTROL (Levels D and E)

Duplicate injections performed as required?	Yes	No	N/A
Duplicate injection %RSD values acceptable?	Yes	No	N/A
Analytical spikes performed as required?	Yes	No	N/A
Analytical spike recoveries acceptable?	Yes	No	N/A
Standards traceable?	Yes	No	N/A
Standards expired?	Yes	No	N/A
MSA performed as required?	Yes	No	N/A
MSA results acceptable?	Yes	No	N/A
Transcription/calculation errors?	Yes	No	N/A

Comments:_____

8. HOLDING TIMES (all levels)

Samples properly preserved?	Yes	No	N/A
Sample holding times acceptable?	Yes	No	N/A

Comments:_____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

Results reported for all requested analyses? ..... Yes No N/A

Results supported in the raw data? (Levels D, E) ..... Yes No N/A

Samples properly prepared? (Levels D, E) ..... Yes No N/A

Detection limits meet RDL? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: _____

Appendix 6

Additional Documentation Requested by Client

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	Reported: 09/18/2012 12:58

Metals by SW846 6000/7000 series - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209076 - SW 3005A										
Blank (L209076-BLK1)				Prepared: 09/12/2012 Analyzed: 09/17/2012						
Aluminum	26.4	B	50.0	ug/L						
Antimony	6.00	U	6.00	ug/L						
Arsenic	4.00	U	4.00	ug/L						
Barium	5.00	U	5.00	ug/L						
Cadmium	2.00	U	2.00	ug/L						
Calcium	1000	U	1000	ug/L						
Chromium	2.00	U	2.00	ug/L						
Cobalt	20.0	U	20.0	ug/L						
Copper	10.0	U	10.0	ug/L						
Iron	50.0	U	50.0	ug/L						
Lead	5.00	U	5.00	ug/L						
Magnesium	27.2	B	750	ug/L						
Manganese	0.632	B	5.00	ug/L						
Nickel	40.0	U	40.0	ug/L						
Potassium	4000	U	4000	ug/L						
Selenium	5.00	U	5.00	ug/L						
Silver	2.00	U	2.00	ug/L						
Sodium	500	U	500	ug/L						
Tin	1.00	U	1.00	ug/L						
Vanadium	25.0	U	25.0	ug/L						
Zinc	10.0	U	10.0	ug/L						
LCS (L209076-BS1)				Prepared: 09/12/2012 Analyzed: 09/17/2012						
Aluminum	4980		50.0	ug/L	5000.0		100	80-120		
Antimony	3150		6.00	ug/L	3000.0		105	80-120		
Arsenic	10600		4.00	ug/L	10000		106	80-120		
Barium	5190		5.00	ug/L	5000.0		104	80-120		
Cadmium	225		2.00	ug/L	250.00		90	80-120		
Calcium	25800		1000	ug/L	25000		103	80-120		
Chromium	512		2.00	ug/L	500.00		102	80-120		
Cobalt	2560		20.0	ug/L	2500.0		102	80-120		
Copper	1310		10.0	ug/L	1250.0		105	80-120		
Iron	5260		50.0	ug/L	5000.0		105	80-120		
Lead	2520		5.00	ug/L	2500.0		101	80-120		
Magnesium	25700		750	ug/L	25000		103	80-120		
Manganese	784		5.00	ug/L	750.00		105	80-120		
Nickel	2040		40.0	ug/L	2000.0		102	80-120		

LVL
LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 09/18/2012 12:58

Metals by SW846 6000/7000 series - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209076 - SW 3005A										
LCS (L209076-BS1)					Prepared: 09/12/2012 Analyzed: 09/17/2012					
Potassium	25400		4000	ug/L	25000		102	80-120		
Selenium	10500		5.00	ug/L	10000		105	80-120		
Silver	526		2.00	ug/L	500.00		105	80-120		
Sodium	25900		500	ug/L	25000		104	80-120		
Tin	5270		1.00	ug/L	5000.0		105	80-120		
Vanadium	2600		25.0	ug/L	2500.0		104	80-120		
Zinc	1050		10.0	ug/L	1000.0		105	80-120		
Duplicate (L209076-DUP1)		**Source: 1209026-01**			Prepared: 09/12/2012 Analyzed: 09/17/2012					
Aluminum	30.2	B	50.0	ug/L		27.9			8	20
Antimony	6.00	U	6.00	ug/L		6.00 U				20
Arsenic	3.55	B	4.00	ug/L		2.91			20	20
Barium	43.7		5.00	ug/L		44.6			2	20
Cadmium	2.00	U	2.00	ug/L		2.00 U				20
Calcium	40700		1000	ug/L		41300			2	20
Chromium	4.02		2.00	ug/L		4.25			6	20
Cobalt	20.0	U	20.0	ug/L		20.0 U				20
Copper	10.0	U	10.0	ug/L		10.0 U				20
Iron	24.0	B	50.0	ug/L		22.8			5	20
Lead	5.00	U	5.00	ug/L		5.00 U				20
Magnesium	12900		750	ug/L		13100			2	20
Manganese	1.06	B	5.00	ug/L		1.20			13	20
Nickel	1.64	B	40.0	ug/L		1.70			4	20
Potassium	4560		4000	ug/L		4610			1	20
Selenium	3.31	B	5.00	ug/L		4.16			23*	20
Silver	2.00	U	2.00	ug/L		2.00 U				20
Sodium	16100		500	ug/L		16500			3	20
Tin	1.00	U	1.00	ug/L		1.00 U				20
Vanadium	38.6		25.0	ug/L		39.4			2	20
Zinc	10.0	U	10.0	ug/L		10.0 U				20

LVL
LIONVILLE LABORATORY
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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-008 Project Number: K3986 Project Manager: Joan Kessner	**Reported:** 09/18/2012 12:58

Metals by SW846 6000/7000 series - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L209076 - SW 3005A									
Matrix Spike (L209076-MS1)	**Source: 1209026-01**	Prepared: 09/12/2012 Analyzed: 09/17/2012							
Aluminum	2080	50.0	ug/L	2000.0	27.9	103	75-125		
Antimony	539	6.00	ug/L	500.00	6.00 U	108	75-125		
Arsenic	2130	4.00	ug/L	2000.0	2.91	106	75-125		
Barium	2160	5.00	ug/L	2000.0	44.6	106	75-125		
Cadmium	47.5	2.00	ug/L	50.000	2.00 U	95	75-125		
Calcium	66500	1000	ug/L	25000	41300	101	75-125		
Chromium	209	2.00	ug/L	200.00	4.25	102	75-125		
Cobalt	513	20.0	ug/L	500.00	20.0 U	103	75-125		
Copper	267	10.0	ug/L	250.00	10.0 U	107	75-125		
Iron	1100	50.0	ug/L	1000.0	22.8	108	75-125		
Lead	497	5.00	ug/L	500.00	5.00 U	99	75-125		
Magnesium	38300	750	ug/L	25000	13100	101	75-125		
Manganese	525	5.00	ug/L	500.00	1.20	105	75-125		
Nickel	514	40.0	ug/L	500.00	1.70	102	75-125		
Potassium	30100	4000	ug/L	25000	4610	102	75-125		
Selenium	2090	5.00	ug/L	2000.0	4.16	104	75-125		
Silver	54.0	2.00	ug/L	50.000	2.00 U	108	75-125		
Sodium	41800	500	ug/L	25000	16500	101	75-125		
Tin	1020	1.00	ug/L	1000.0	1.00 U	102	75-125		
Vanadium	574	25.0	ug/L	500.00	39.4	107	75-125		
Zinc	544	10.0	ug/L	500.00	10.0 U	109	75-125		